

**MEMORANDUM**

DATE: March 24, 1997

SUBJECT: Removal Action at the 233-S Plutonium Concentration Facility, United States Department of Energy (USDOE) Hanford Site, Benton County, Washington

**I. PURPOSE**

The purpose of this Action Memorandum is to document approval of the proposed non-time critical removal action described herein for the 233-S Plutonium Concentration Facility (233-S Facility), USDOE Hanford Site, Benton County, Washington.

This removal action minimizes the potential for a release of hazardous substances in the 233-S Facility that could adversely impact human health and the environment, is protective of site personnel, and minimizes disposal costs.

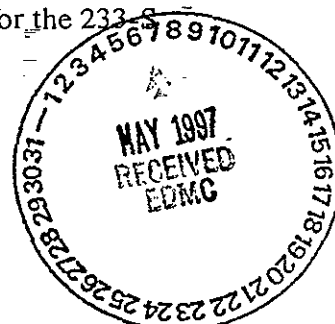
A 30-day public comment and review period was held from January 27 through February 25, 1997. All comments received generally supported implementation of this action. The comments and responses are contained in the Administrative Record for the 233-S Facility.

**II. SITE CONDITIONS AND BACKGROUND****A. Site Description****1. Background**

Pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), the United States Environmental Protection Agency (EPA) added the 100, 200, 300, and 1100 Areas of the USDOE operated Hanford Site to the National Priorities List (NPL) in November of 1989. The Reduction-Oxidation (REDOX) Plant is located in the 200 Area and was brought on line in January 1952. The REDOX Plant was the world's first nuclear solvent extraction plant using the reduction-oxidation process and operated through July 1967. The 233-S Facility was built in 1955 to expand production and further concentrate the plutonium nitrate product solution from the REDOX facility.

**2. Physical location**

The Hanford Site occupies approximately 1450 km<sup>2</sup> (560 mi<sup>2</sup>) of the southeastern part of Washington State north of the confluence of the Yakima and Columbia Rivers. The 200 West Area is a controlled area of



approximately 8.3 km<sup>2</sup> (3.2 mi<sup>2</sup>) near the middle of the Hanford Site. It is about 8 km (5 mi) from the Columbia River and 11 km (6.8 mi) from the nearest Hanford boundary. The REDOX Plant lies in the southern portion of the 200 West Area. The 233-S Facility is located on the north side of the REDOX Plant in the 200 West Area of the Hanford Site.

### **3. Site characteristics**

The 233-S Plutonium Concentration Facility is composed of the original 233-S process building, additions/modifications thereto, the 233-SA exhaust filter building, and interconnecting piping, trenches, and ducting. The 233-S Building was modified by expansion in 1958. This expansion included the addition of maintenance platforms in the process cell viewing room with an exterior stairwell and airlocks for entry, an additional plutonium removal (PR) can room, and a spare exhaust. Modifications in 1962 included the installation of an anion exchange purification process in the process hood, the conversion of one plutonium concentrator for neptunium use and other vessel modifications, and numerous piping modifications. The 233-SA exhaust filter building was added in 1964 after a process upset which resulted in a fire. The fire, which occurred in 1963, severely damaged the anion exchange concentrator in the process hood, and the anion exchange purification process was abandoned without equipment removal. Following an intensive 6-week cleanup of the facility surroundings and roof, the residual contamination was fixed with paint and the 233-S Facility was restarted and operated until deactivation in 1967. This deactivation process included flushing the process system with nitric acid (with rinse solution sent back to REDOX), decontamination of contaminated surfaces, and the application of fixatives. This building has been addressed by DOE's Surplus Facility Management Program since 1967 as a retired facility.

### **4. Releases or threatened release into the environment of a hazardous substance, or pollutant or contaminant**

The 233-S Facility is contaminated with hazardous substances used in or generated by plutonium concentration operations. Most of the hazardous substances are radioactive materials that contaminated the interior of the 233-S Facility. Fissile material inventories are also known to exist. The major inventory of fissile material is contained within the vessels of the process hood, but some fissile contamination is found throughout most of the facility. Current radiation survey data indicate that fixed contamination exists in all rooms and on the roof. Smearable plutonium (alpha) and minor mixed fission products (beta/gamma) contamination exists in the process hood, viewing room, PR can load-out room, stairwell, stairwell airlocks, and pipe gallery.

All identified quantities of concentrated hazardous chemicals have been removed from the 233-S Facility, although there may be some residual liquid in the process lines. Chemicals such as acetylene tetrabromide, hexone, nitric acid, sodium nitrate, and various coatings and caulking compounds are known to have been used in the 233-S Facility while the facility was operating; however, since deactivation, these substances have not been found to exist in the building in more than very minor quantities. The building is expected to contain one or more of the hazardous materials that are present in most buildings at the Hanford Site. These materials include polychlorinated biphenyl (PCB) light ballast and non-PCB light ballast, lead paint, lead for shielding, mercury switches, fluorescent light bulbs, mercury or sodium vapor lights, and used oils from motors and pumps.

The 233-S Facility has been in a continual state of slow deterioration since its deactivation in 1967, but routine maintenance has so far been adequate to prevent environmental releases. Although decontamination and decommissioning has been initiated several times in the past, budget constraints caused deferral of permanent solutions. Ongoing maintenance efforts are becoming increasingly costly and are not totally responsive to the advancing deterioration process, thereby ranking this facility as an urgent priority for decommissioning. In addition, severe weather during the winter of 1995 to 1996 has accelerated the deterioration such that the facility represents a current potential for radiological release to the environment.

#### **B. Other Actions to Date**

Decontamination and decommissioning activities were performed on approximately 25% of the facility during fiscal years 1979 and 1980. Further D&D work was scheduled for fiscal year 1981 but was deferred because of budget constraints. Further stabilization and modifications of the facility were performed in December 1987 to remove loose surface contamination from the rooms and spaces adjacent to the process hood (excluding the process hood and pipe gallery). Activities that occurred in December 1987 include the following:

- Ventilation system repair and modification
- Outside area decontamination and stabilization
- Interior decontamination and stabilization
- Final radiological survey.

### III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT

Hazardous substances, including radioactive substances, contained within the 233-S Facility pipes and process vessels and as fixed contamination within the rooms may pose a threat of release as the structural integrity of the facility is compromised, resulting in a potential direct exposure of nearby Hanford Site personnel and exposure to the public through air borne contaminants. The surveillance and maintenance activities required to maintain confinement of the building will increasingly pose a potential exposure to personnel assigned to the activity.

### IV. ENDANGERMENT DETERMINATION

Actual or threatened releases of hazardous substances, including radioactive substances, from this site, if not addressed by implementing the response action selected in this Action Memorandum, may present an endangerment to public health, welfare, or the environment.

### V. PROPOSED ACTIONS AND ESTIMATED COSTS

#### A. Proposed Actions

##### 1. Proposed action descriptions

An Engineering Evaluation/Cost Analysis (EE/CA) was prepared in order to develop removal action alternatives for the 233-S Facility. The EE/CA proposed four alternatives. A fifth alternative, containment by grout injection, was also examined. This alternative would consist of placing grout inside the facility (filling the room spaces and systems), installing vadose zone monitoring holes, and installing an earthen cap on top of the grouted monolith. This alternative was screened out for the following reasons: this technology has never been applied as a response action for permanent containment of TRU levels of radionuclides in an aboveground structure, and there has been no opportunity for significant evaluation of the potential effectiveness of the technology or of the administrative implementability of the response action. Decisions regarding future use of the area around the facility are not yet definite enough to determine whether this alternative would be consistent with the likely final remedy for the surrounding operable unit. The current conditions in the facility require expedited action. Therefore, because the exigencies of the situation do not allow resolution of the uncertainties involved in the containment alternative, it was not evaluated in detail.

The four remaining alternatives are described as follows:

**a. No Action**

Under the no-action alternative, access to the facility would be restricted, but no action would occur to address the hazards posed by the facility. The 233-S facility would be left to continue to deteriorate. Although Hanford Site institutional controls would continue to help prevent personnel or worker entry to the facility, releases of contaminants from the facility would ultimately occur.

This alternative was not selected because no action would increase risk due to the substantial likelihood of a loss of confinement of hazardous substances within the 233-S Facility presenting a potential and unnecessary threat to human health and the environment.

**b. Continued Surveillance and Maintenance**

The continued S&M alternative would ensure that the 233-S Facility would be sustained in a safe condition until the year 2017 when final disposition of the REDOX complex occurs. The facility would be maintained in an inactive state while ongoing preventive measures are implemented. These measures would include weekly radiological and industrial hazard monitoring both inside and outside of the facility, accompanied by monthly filter changes on inter-space penetrations. The 233-SA Facility exhaust system filters would be tested on a biannual basis and yearly safety inspections would provide comparative information for the tracking of facility deterioration. Major maintenance operations, such as the needed roof repair, would be performed to ensure the maintenance of safe conditions and control of the ongoing deterioration process. Additionally, limited decontamination and fixative application would occur to control the spread of radiological contamination.

This alternative was not selected because it causes continued risk to workers without reducing overall protection of human health and the environment, except by decay of radioactive contaminants over a long period of time. This is not cost effective because the 233-S Facility will continue to age, and maintaining sufficient integrity to minimize the threat of a release and protect workers will become increasingly difficult and costly.

**c. Decontamination with Reduced Surveillance and Maintenance**

The primary goals of this alternative are to remove the bulk inventory of fissile material from the facility and to decontaminate building surfaces to radiation levels that can be readily managed by a minimum S&M program. S&M would be continued until final disposition of the REDOX complex occurs in approximately 2017 (20 years).

Initial decontamination efforts in the 233-S Facility would be directed toward cleaning of the process hood so that in-hood operation can be performed by workers. Cleaning would involve the collection and removal of debris on the process hood floor followed by thorough vacuuming and wiping to remove contaminant particles. This latter effort may be accompanied by misting operations to remove particulates from the air. These cleaning efforts would most likely be followed by an additional misting of a fixative solution that would serve to cleanse the air of particulates and fix them to in-hood surfaces. Operations to remove the process system, and hence the bulk of the fissile material inventory, would then proceed. With the completion of these operations, the fissile material inventory in the 233-S and 233-SA buildings would be reduced to a level where nuclear criticality concerns are eliminated and only radiological concerns remain.

Following removal of the process system, decontamination efforts in the facility would involve the removal of other equipment and systems and the use of various decontamination technologies to remove contamination from facility surfaces. Contaminants that cannot be readily removed will be fixed by the application of an adhesive protective coating.

Once this scope of work has been completed, a minimum effort S&M program would be implemented until final disposition of the REDOX complex occurs. This would include radiological and industrial hazard monitoring both inside and outside of the facility and yearly safety inspections which would provide comparative information for the tracking of facility deterioration.

The various waste forms (TRU, LLW, mixed, and hazardous) would be packaged and appropriately disposed of during the decontamination efforts in accordance with applicable requirements. Waste generated during S&M is expected to be minimal and would be disposed of as it is generated.

Although this alternative is protective of human health and the environment it was not selected primarily because it is less cost effective than the selected alternative. Surveillance and maintenance costs would be incurred until future required demolition activities occur for the 233-S Facility concurrent with the disposition of the REDOX Facility.

**d. Decontamination and Demolition**

The primary goals of this alternative are to remove the bulk inventory of fissile material from the facility, modify the facility to an acceptable state for demolition through decontamination, remove the facility and its associated systems by demolition/dismantlement operations, and dispose of the various waste forms generated in these operations. The fissile material inventory removal and facility decontamination would be achieved as discussed in the previous alternative.

If decontamination of facility surfaces can successfully reduce smearable radioactive contamination levels to less than 20 dpm/100cm<sup>2</sup> and total (fixed + smearable) radioactive contamination levels to less than 500 dpm/100cm<sup>2</sup>, conventional demolition can be employed and these waste products may be disposed of in onsite inert demolition landfills, provide the material is not hazardous. More realistically, decontamination of facility surfaces would probably only be partially achieved and fixatives would be used to immobilize permeated surface contaminants. This facility condition would necessitate the use of controlled dismantlement for at least some portions of the facility, with most waste materials being disposed of as LLW or mixed waste. Controlled dismantlement may involve the use of specialized diamond wire concrete cutting techniques, contaminant confinement measures during cutting operations, hoisting and rigging of structural sections, and waste disposal.

Facility removal would include both the 233-S and 233-SA buildings and subsurface systems and structures to a depth of 0.91 m (3 ft). Piping and trenches extending away from the buildings may be removed as necessary to accommodate the removal action for the structures. In general, the subsurface structures are only included to a depth of 1 m (3 ft). Underground piping and trenches extending away from the facility are only included in the scope to a distance of 1 m (3 ft) from the walls of the structure, although additional piping or trenches might be removed as necessary to accommodate the removal action for the structure. Grossly

contaminated substructures will be removed, isolated, fixed, or stabilized. Uncontaminated structures or portions of structures associated with this facility may be removed to facilitate implementation of an action. Contaminated and uncontaminated soil for a distance of 1 m (3 ft) from the walls and floors of the structure may be moved or removed to implement the removal action for the structures; however, the scope of this removal action does not include soil, groundwater, or other nearby waste sites. Further soil remediation and/or capping would be conducted, as necessary, in coordination with remedial actions taken to address the operable unit. The various waste forms (TRU, LLW, mixed and hazardous) would be packaged in accordance with the packaging requirements specified in the Environmental Restoration Disposal Facility Waste Acceptance Criteria, BHI-00139, Rev. 2, or the Hanford Site Solid Waste Acceptance Criteria, WHC-EP-0063, Rev. 4, as appropriate and disposed of (see Common Element section) during the various operations.

Based on the ability to achieve overall effectiveness, long- and short- term effectiveness, implementability, and cost effectiveness, the selected removal action alternative is to decontaminate and demolish the 233-S Facility and dispose of wastes to the ERDF. This alternative removes the potential for a release of hazardous substances that could adversely impact human health and the environment, is protective of site workers, reduces overall S&M costs, and is consistent with other cleanup activities in the 200 Area as well as in other areas of the Hanford Site.

## **2. Common Elements**

With the exception of the no-action alternative, each of the alternatives will result in generation of waste. Therefore, waste management is a common element to each of these alternatives.

CERCLA Section 104(d)(4) states where two or more noncontiguous facilities are reasonably related on the basis of geography, or on the basis of the threat or potential threat to the public health or welfare or the environment, the President may, at his discretion, treat these facilities as one for the purposes of this section. The preamble to the NCP clarifies the stated EPA interpretation that when non-contiguous facilities are reasonably close to one another and wastes at these sites are compatible for a selected treatment or disposal approach, CERCLA Section 104(d)(4) allows the lead agency to treat these related facilities as one site for response purposes and, therefore, allows the lead agency to manage waste transferred between such non-contiguous facilities without having to obtain

a permit. Therefore, the 233-S Facility and the ERDF, which is also in the 200 Area, are considered to be a single site for response purposes under this Action Memorandum.

Contaminated wastes for which no reuse, recycle, or decontamination option is identified would be assigned an appropriate waste designation (e.g., TRU, radioactive, dangerous, or mixed). Most of the waste generated during implementation of these alternatives will be disposed to the Environmental Restoration Disposal Facility (ERDF) in the 200 West Area of the Hanford Site. The ERDF has been evaluated as the preferred waste disposal option because it is an engineered facility that generally provides greater duration of protection to human health and the environment, and is more cost effective than other disposal options. Waste sent to the ERDF must meet the criteria specified in the ERDF Waste Acceptance Criteria prior to shipment to the facility. Before wastes may be shipped to any off-site facility, the EPA shall make an acceptability determination that the waste facility is acceptable to receive wastes from a CERCLA action.

TRU waste would be stored at the Transuranic Waste Storage and Assay Facility (TRUSAF) in the 200 Area of the Hanford Site until a final disposal site is identified. If the TRUSAF facility becomes unavailable because of deactivation activities, the Central Waste Complex (CWC) will be utilized for storage of TRU generated by 233-S, in accordance with applicable requirements. Uncontaminated rubble that cannot be recycled would be disposed in one of the Hanford Site's inert waste landfills or other designated rubble pits approved for disposal of this material.

Both radioactive and nonradioactive liquid wastes might be encountered or generated during decommissioning. Non-hazardous, radioactive liquids may be sent to the Hanford Effluent Treatment Facility (ETF) provided the waste meets any applicable permit or other requirements. With EPA approval, small amounts of liquid may be treated or stabilized (to meet applicable waste acceptance criteria) and sent to the ERDF for disposal. Liquids may also be solidified at the Plutonium Finishing Plant in the 200 West Area of the Hanford Site and packaged for disposal at ERDF, provided applicable permit or other requirements are satisfied. With EPA approval, nonradioactive liquids contaminated with hazardous constituents that could not be treated to meet ERDF Waste Acceptance Criteria would be packaged and shipped to a permitted facility for storage, treatment, and/or disposal in compliance with applicable regulations.

3. **Applicable or Relevant and Appropriate Requirements (ARAR) and other Criteria, Advisories, or Guidance to be considered (TBCs)**

Removal actions shall, to the extent practicable considering the exigencies of the situation, attain applicable or relevant and appropriate requirements under federal and state environmental laws. The selected alternative shall comply with the federal and state ARARs identified. No waivers are being sought at this time. The ARAR identified for the 233-S Facility Removal Action are:

- ***Resource Conservation and Recovery Act - Title 42 USC 6901 et seq., Subtitle C.*** The Resource Conservation and Recovery Act (RCRA) regulates the generation, transportation, storage, treatment, and disposal of hazardous waste. Hazardous waste management regulations promulgated pursuant to RCRA are codified at 40 CFR Part 260 through 268. Regulations established under RCRA are applicable to any hazardous waste generated during the actions at the 233-S Facility.
- ***Dangerous Waste Regulations - WAC 173-303.*** The Washington State Dangerous Waste Regulations implement the federal Hazardous Waste Regulations promulgated pursuant to RCRA. Washington Administrative Code (WAC) 173-303 requires identification and appropriate management of dangerous wastes, the dangerous component of mixed wastes, and identifies standards for treatment and disposal of these wastes. These requirements are applicable to any waste existing or generated in the 233-S Facility that designates, in accordance with WAC 173-303, as a dangerous or mixed waste.
- ***Solid Waste Regulations - WAC 173-304.*** WAC 173-304 requires identification and appropriate management of solid wastes. It is applicable to any solid waste generated at the 233-S Facility.
- ***Toxic Substances Control Act - Title 15 USC 2601 et seq.*** Implementing regulations in 40 CFR 761 contain requirements for the management of spills and cleanup of materials suspected to contain PCB waste. The ERDF is authorized to accept certain PCB waste for disposal. All waste at the 233-S Facility suspected to contain PCBs will be evaluated to determine whether it meets the ERDF Waste Acceptance Criteria. Any PCB waste that does not meet the ERDF Waste Acceptance Criteria will be sent to an on-site PCB storage area that meets all requirements of TSCA, and will be transported for disposal at a TSCA-approved disposal facility.

- ***National Emission Standards for Hazardous Air Pollutants - 40 CFR Part 61 and Radiation Protection Air Emissions - WAC 246-247.*** The Clean Air Act regulates both toxic and radioactive airborne emissions. Under implementing regulations found in 40 CFR 61, Subpart H, and WAC 246-247, radionuclide airborne emissions from all combined operations at the Hanford Site may not exceed 10 mrem/year effective dose equivalent to the hypothetical offsite maximally exposed individual.

Removal and disposal of asbestos and asbestos-containing material are also regulated under the *Clean Air Act*. Asbestos packaging requirements are identified in 40 CFR Part 61.52.

- ***State Radiation Protection Standards - Ch. 70.98 RCW.*** Washington State Radiation Standards (Ch. 70.98 RCW) were developed pursuant to the Atomic Energy Act of 1954 and are implemented in WAC 246-220 through WAC 246-255. Not all the standards in the referenced chapters are specifically applicable to the 233-S Facility, and only the following standards are considered as ARARs. WAC 246-221, Radiation Protection Standards, is applicable because it establishes the maximum allowable radiation dose to individuals in restricted areas, exposure to minors, and permissible levels of radiation from external sources in unrestricted areas. The occupational dose limit for adults, excluding planned special exposures, shall not exceed an annual limit of a total effective dose equivalent equal to 5 rem, or the sum of the deep dose equivalent and the committed dose equivalent to any individual organ or tissue other than the lens of the eye should not exceed 50 rem. An eye dose equivalent of 15 rem is set for exposure to the eye. The shallow dose equivalent for the skin or any extremities is 50 rem. Occupational dose limits for minors are set at 10% of the annual occupational dose limits for adults.

The standard identifies the methods required to demonstrate compliance and provides derived air concentration and annual limit on intake values that may be used to determine an individual's occupational dose limits. The dose limits that individual members of public may receive in unrestricted areas or from radioactive effluent should not cause an individual to receive from external sources, more than 0.002 rem in an hour or 0.50 rem in a year. The WAC 246-247, Radiation Protection - Air Emissions, promulgates air emission limits for airborne radionuclide emissions at the same levels as defined in WAC 173-480, which are consistent with federal NESHAPs. The ambient standard requires that emission of

radionuclides to the air must not cause a dose equivalent of 25 mrem/year to the whole body or 75 mrem/year to any critical organ.

- ***U.S. Department of Transportation Requirements for the Transportation of Hazardous Materials (49 CFR Parts 100 to 179).*** U.S. Department of Transportation requirements are applicable for any hazardous materials shipped off site.
- ***Hazardous Materials Transportation Act (49 USC 1801-1813).*** The Hazardous Materials Transportation Act is applicable to the transportation of potentially hazardous materials shipped off site that are generated during sampling or the removal action at the 233-S Facility.
- ***National Historic Preservation Act (Title 16 USC 470, et seq.)*** The National Historic Preservation Act of 1966 (implemented via 36 CFR Part 800) requires federal agencies to evaluate and mitigate adverse effects of federal activities on any site eligible for inclusion on the National Register of Historic Places. This requirement is applicable since the 233-S Facility has been identified as part of an overall operation (REDOX) that is eligible for inclusion on the National Register of Historic Places. The State of Washington Historic Preservation Office determined that the 233-S Facility has potential historical significance, although the 233-S Facility is not considered to be individually eligible for listing on the National Register of Historic Places. The required documentation (Historic American Engineering Record WA-129-A) was prepared and submitted to the National Park Service. Upon receipt of the documentation package, the National Park Service archived the package in the Library of Congress, thus allowing the dismantlement of the 233-S Facility to proceed.
- ***Endangered Species Act.*** The Endangered Species Act of 1973 (implemented via 50 CFR 402) and WAC 232-12-297 prohibit activities that threaten the continued existence of listed species or destroy critical habitat. The *Migratory Bird Treaty Act* makes it illegal to take, capture, or kill any migratory bird, or any part of nests or eggs of any such birds.

These requirements are applicable since threatened and endangered species are known to occur on the Hanford Site although they are not likely in the 200 Area. A facility-specific ecological review shall be conducted prior to the decommissioning of the facility to verify that no potential adverse impacts exist regarding any threatened and endangered species or migratory birds.

- *National Archeological and Historical Preservation Act - Title 16 USC 469.* The Archeological and Historical Preservation Act (implemented via 36 CFR Part 65) requires action to recover and preserve artifacts in areas where activity may cause irreparable harm, loss, or destruction of significant artifacts.

**Other Criteria, Advisories, or Guidance to be considered (TBCs)**

- *Environmental Restoration Disposal Facility Waste Acceptance Criteria, (BHI-00139).* The Waste Acceptance Criteria for ERDF defines the primary requirements that the waste must meet in order to be accepted at the ERDF, with citations to specific regulations, including isotopic constituent and concentration limits, dangerous/hazardous constituent concentration limits, and acceptable physical waste characteristics.
- *Hanford Site Solid Waste Acceptance Criteria, WHC-EP-0063, Rev. 4.* This document identifies specific criteria for acceptance of waste at storage and disposal units and facilities at the Hanford Site with the exception of the Environmental Restoration Disposal Facility. The criteria must be met prior to shipment of waste to the Effluent Treatment Facility, the Transuranic Storage Facility, and the Central Waste Complex.
- Certain requirements in DOE Order 4330.4B, *Maintenance Management Program* regarding facility maintenance should be considered.

**Note:** The USDOE, and its contractors, are required to comply with the applicable worker health and safety requirements (see 40 CFR § 300.150).

- The requirements in DOE Order 5400.5, *Radiation Protection of the Public and the Environment* (DOE 1993b) for limiting exposure of the public to radioactive releases should be considered.
- The requirement in DOE Order 5440.1E, *National Environmental Policy Act Compliance Program* (DOE 1992a) to address NEPA values has been addressed in the EE/CA.
- The requirement in DOE Order 5480.3, *Safety Requirements for the Packaging and Transportation of Hazardous Materials, Hazardous Substances and Hazardous Waste* (DOE 1985) to comply with Department of Transportation or equivalent packaging standards should be considered for waste generated for disposal,

and the requirements of the order for special handling of plutonium-bearing wastes should be considered for decommissioning.

- The requirements in DOE Order 5480.7A, *Fire Hazards Analysis* (DOE 1993a) to analyze and provide controls for fire hazards should be considered.
- The requirements in DOE Order 5480.20A, *Personnel Selection, Qualification and Training* (DOE 1994) should be considered.
- The requirements in DOE Order 5480.21, *Unreviewed Safety Questions* (DOE 1991) to evaluate changes for potential safety impacts should be considered.
- The requirement in DOE Order 5480.22, *Technical Safety Requirements* (DOE 1992c) to establish bounding conditions for safety operations should be considered.
- The requirements in DOE Order 5480.23, *Nuclear Safety Analysis Reports* (DOE 1992b) to identify hazards, analyze hazards and accidents, and identify controls and mitigation measures to safely manage the hazards should be considered.
- The requirements in DOE Order 5480.24, *Nuclear Criticality Safety* (DOE 1992d) to analyze potential criticality hazards and identify controls to manage such hazards should be considered.
- The requirements in DOE Order 5480.28, *Natural Phenomena Hazards Mitigation* to analyze potential hazards from natural phenomena and identify appropriate mitigation measures should be considered.
- The requirement in DOE Order 5480.31, *Start-up and Restart of Nuclear Facilities* (DOE 1993c) to review the status of readiness should be considered.
- The requirements in DOE Order 5820.2A, *Radioactive Waste Management* (DOE 1988) for management of LLW should be considered. The requirements for the management of TRU waste should be considered during decommissioning if one or more packages of waste are generated that contain greater than 100nCi/g of TRU constituents at the time of assay.
- The requirements in DOE Order 6430.1A, *General Design Criteria* (DOE 1989) for demolition of structures should be considered.

## **B. Estimated Costs**

The following is a summary of estimated costs for each removal action evaluated in the EE/CA.

The cost for the no-action alternative is negligible in the long-term.

The total estimated costs of the S&M alternative is \$8.5 million based on the costs associated with current S&M, but do not include any estimate of the additional costs for potential structural modifications, ventilation upgrades, or installation of remote monitoring systems that would be incurred for surveillance as the condition of the building deteriorates. This cost was also based on continuing S&M activities up to the year 2017, when the disposition of the REDOX facility is planned. Costs for S&M also include a new roof or extensive repairs to the portions of the roof subject to cracking failure and repairs to the cracks in the concrete structure, which continue to increase in length from exposure to extreme weather conditions. These major maintenance activities would cost several million dollars. An additional cost will be incurred in the future for decontamination and dismantlement of the 233-S Facility.

The costs for the third alternative (decontamination and disposal without demolition) is approximately \$12 million. An additional cost will be incurred in the future for dismantlement of the 233-S Facility.

The cost for the fourth alternative (decontamination, disposal and demolition), which is presented below, is approximately \$14 million.

**Cost and Schedule Estimates: Decontamination, Demolition, and Disposal.**

Facility/Room	Estimated Time Required for Decontamination and Demolition (months)	Estimated Cost for Decontamination, Demolition, and Disposal*
Mobilize	2	\$86,000
Nonprocess Pipe Gallery	3	\$267,000
Isolate Process Hood	9	\$308,000
Remove Vessels and Decon Hood	12	\$744,000
Remove Ductwork	9	\$451,000
Decon Structure	5	\$211,000
Dismantle Facilities	10	\$1,038,000
Remove Subgrade Structure	5	\$92,000
Backfill/Cap	0.5	\$566,000
Closeout/Demobilize	0.5	\$102,000
Project Management	--	\$5,993,000
Equipment		\$480,000
Consumables		\$990,000
Disposal of 871 yd <sup>3</sup> <ul style="list-style-type: none"> <li>• LLW<sup>a</sup> -461 yd<sup>3</sup></li> <li>• LLW - Mixed<sup>a</sup> - 9 yd<sup>3</sup></li> <li>• Dangerous<sup>a</sup> -1 yd<sup>3</sup></li> </ul> <ul style="list-style-type: none"> <li>• Clean Rubble<sup>b</sup> -187 yd<sup>3</sup></li> <li>• TRU - Mixed<sup>c</sup> - 123 yd<sup>3</sup></li> <li>• TRU<sup>c</sup> -90 yd<sup>3</sup></li> <li>• Sampling and characterization (Assay and sample analysis, includes subcontracts)</li> </ul>	--	\$25,355 <sup>b</sup> \$495 <sup>b</sup> \$55 <sup>b</sup>  \$477,794 \$337,284 \$1,365,000
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<b>Total</b>		<b>\$13,533,983</b>

\*Key cost assumptions include disposal of low-level radioactive waste at the ERDF at \$55/yd<sup>3</sup>.

<sup>b</sup>Includes the costs of waste disposal, container procurement, waste transportation, and waste characterization. No cost is associated with disposal of inert (nonhazardous) demolition waste.

<sup>c</sup>CWC- \$3,884.50/yd<sup>3</sup> mixed waste and \$3,747.60/yd<sup>3</sup> TRU waste.

### **C. Project Schedule**

The 233-S Facility removal action is scheduled to begin June 1997 and continue through July 2001. Prior to initiating this action, the USDOE shall submit the removal action design report to the EPA for review. The EPA shall approve only portions of this plan that implement this Action Memorandum. Additionally, the USDOE is required to submit all waste characterization/ designation sampling plans to EPA for review and approval. The Notice of Construction (NOC) for the 233-S Facility was submitted to the Washington State Department of Health in 1994 and approved for start of construction within 18 months. The USDOE shall revise the NOC and include this as an air monitoring plan as part of the design report for approval by EPA.

### **VI. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN**

Severe weather conditions can create facility conditions amenable to radiological releases, and long-term aging of engineered controls can lead to eventual failure. These conditions, accompanied by minimum surveillance efforts, could result in an unplanned release.

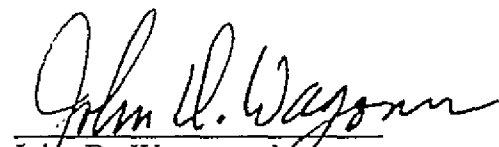
### **VII. OUTSTANDING POLICY ISSUES**

There are no policy issues associated with this removal action.


### **VIII. SELECTED ALTERNATIVE**

This decision document represents the selected removal action alternative as Decontamination and Demolition of the 233-S Plutonium Concentration Facility based on the evaluation presented in the EE/CA. This alternative removes the potential for a release of hazardous substances that could pose a threat to public health, welfare, and the environment, is protective of workers, and minimizes disposal costs. To the extent practicable, by removing sources of contamination before a release occurs, this action will contribute to the efficient performance of any long term remedial actions taken in this area. This proposal was developed in accordance with CERCLA, as amended by the Superfund Amendments and Reauthorization Act, and is not inconsistent with the National Oil and Hazardous Substance Pollution Prevention Contingency Plan. This decision is based on the information provided in the Administrative Record for this project.

Signature sheet for the Action Memorandum for the Removal Action at the 233-S Plutonium Concentration Facility between the U.S. Environmental Protection Agency and the U.S. Department of Energy.

  
John D. Wagoner, Manager  
U.S. Department of Energy  
Richland Operations Office

4/17/97  
Date

  
for Randall F. Smith  
Director, Environmental Cleanup Office  
U.S. Environmental Protection Agency, Region 10

3/26/97  
Date